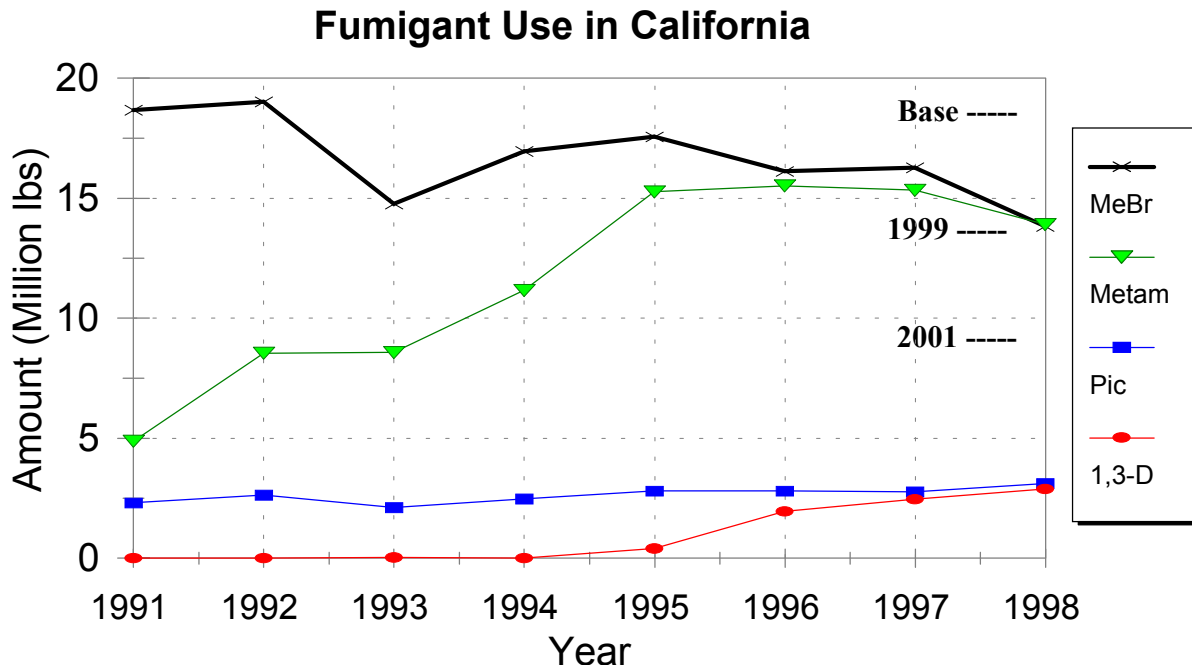


Fumigant Use Trends in California

Tom Trout
USDA-ARS, Fresno CA

The Pesticide Use Reporting (PUR) requirements in California result in a database, maintained by CA Department of Pesticide Regulation, that allow relatively accurate estimation of fumigant use in the state. With this data, we can determine what alternative fumigants growers use for various crops as methyl bromide is phased out.

The figure below shows the fumigant use trends between 1991, the base year for MeBr use limits, through 1998, the last year of unrestricted use, for the 4 primary soil fumigants, methyl bromide (MeBr), 1,3-Dichloropropene (Telone⁷), metam sodium (Vapam) and chloropicrin. Use of MeBr has declined gradually since 1991. By 1998, the last year for which data is available, the use was about 75% of the 1991 use. Thus, the 25% reduction in production/importation of MeBr required by the Montreal Protocol for 1999 was met one year early in California. Note that the price of MeBr in California has increased by over 50% in the last two years.



Use trends of Methyl Bromide (MeBr), metam sodium (Metam), chloropicrin (Pic), and Telone (1,3-D) in California this decade. Amount is million pounds of active ingredient.

The next specified reduction is to 50% of baseline use next year (2001). This 28% reduction from 1998 levels in CA will likely be achieved through market (increasing MeBr cost) and regulatory restrictions, and will result in substitution of alternative fumigants and reduced fumigant use of some crops. In 2003 the production/importation will be reduced to 30% of 1991 levels, with a total phase out by 2005.

While the use of MeBr in California has declined, total fumigant use has increased. Use of metam sodium increased dramatically from 1991 through 1995 and its total use for soil fumigation surpassed MeBr in 1998, when it was applied to three times the number of acres as MeBr. As a low cost fumigant alternative, it has been used mainly on annual vegetable and fruit crops such as carrots, processing tomato and potato. Since Telone was re-introduced in 1994, use of this product has increased dramatically for certain crops. As an effective nematocide, it is used mainly on root crops (carrot, sweet potato, potato) and for replant of perennial fruit and nut trees. Chloropicrin use has remained fairly steady through the years. It is used as a marker for much methyl bromide use, and as a fungicide for strawberry and some other annual crops in combination with MeBr. It has seldom been used as a stand-alone fumigant.

The table shows 1996 - 1998 average fumigant use by crop or crop group. The table lists the amount of fumigant used, the acres fumigated, and the average application rate. I consider the amount of fumigant used to be more reliable than the application area, and thus also than the listed application rates. Acres are especially unreliable for metam sodium use because many records had unreasonably low application rates. Where the data are available, the percent of the total California crop that was fumigated is given. For annual crops, planted acreage was assumed equal to production acreage data listed by CA Ag Statistics Service (CASS) or the USDA-National Ag Statistics Service (NASS). For perennial crops, it was equal to the newly planted acreage each year. These perennial crop statistics are not available for every crop.

About 93% of the MeBr use in California was for preplant soil fumigation, 3% for structural fumigation, and 3% for post-harvest commodity fumigation (1% uncategorized). Use of MeBr for structural fumigation has declined dramatically since 1991. The primary crops for which MeBr is used include strawberry (32% of total soil fumigation); a variety of other annual fruits and vegetables including sweet potato, peppers, tomato, melons, lettuce, and carrots (19%); grapes (12%); a variety of fruit and nut trees such as almonds, walnuts, and peaches (19%); nursery crops (12%); and cut flowers (4%).

Strawberry is by far the most dependent on MeBr + Chloropicrin fumigation (about 90% fumigated each year), while over 50% of sweet potato and carrot acreage is fumigated with one of the fumigants. About one-third of several types of nut and fruit tree orchards and vineyards are fumigated with MeBr before being planted. What these data don't show is the effective fumigation of land planted to other annual crops that are grown in rotation with the listed fumigated crops, such as lettuce or broccoli following strawberry. No estimates were made of nursery planted acreage, but essentially all ground used to grow certified nursery plants is fumigated.

Fumigant Use in California

from CA Dept. of Pesticide Regulation Pesticide Use Database

Average for years 1996 - 1998

Crop	Methyl Bromide				Telone				Metham Sodium				Chloropicrin			
	Amount	Area	Rate		Amount	Area	Rate		Amount	Area	Rate		Amount	Area	Rate	
	lbs	acres	%	lbs/ac	lbs	acres	%	lbs/ac	lbs	acres	%	lbs/ac	lbs	acres	%	lbs/ac
Perennials																
Almond	879,534	4,132	15%	213	101,077	350		289	11,735	118		99	3,556	1,137		3
Peach	422,894	1,544	35%	274	94,277	295		320					4,044	484		8
Nectarine	224,028	715		313	32,102	101		316								
Prune	171,749	619	34%	277	7,833	26		303								
Plum	127,974	439		292	33,713	104		325								
Other Prunus	5,020	17		300	6,046	18		330	3,533	23		152	2,959	644		5
Apple, Cherry, Pear	96,609	361		267	6,084	29		206	11,649	187		62				
Orange	73,719	217	6%	340	15,895	49		325	31,765	380		84				
Lemon	53,754	152	12%	353	7,798	31		249	7,454	613	48%	12				
Other Citrus	13,835	46	8%	300					3,495	73		48	3,935	167		24
Other Fruit Trees	58,052	196		297	5,475	20		274	49	2		28	2,337	270		9
Walnut	453,880	1,693	31%	268	41,535	136		305	5,513	82		67				
Other Nut Trees	80,114	260		308									1,816	507		4
Wine Grapes	1,118,152	3,019	11%	370	95,655	369		259	20,838	524		40				
Other Grapes	625,953	1,890	32%	331	82,314	306		269	22,682	330		69	12,187	3,622		3
Other Vine Fruits	48,952	144		341	16,600	75		222								
Raspberry, Other Bushberries	51,640	247		209	600	3		201	2,822	12		242	27,061	245		111
Total - Perennials	4,505,855	15,691		287	547,004	1,913		286	121,536	2,343		52	57,895	7,076		8
Annual Fruits and Vegetables																
Strawberry	4,572,303	21,399	89%	214	6,089	39		158	57,782	297		195	2,086,659	21,545		97
Sweet Potato	646,587	4,449	46%	145	142,012	1,034	11%	137	255,792	1,169	12%	219	3,732	2,378		2
Peppers (Vegetable)	354,349	1,948	8%	182	32,978	389	2%	85	236,385	2,467	10%	96	39,872	766		52
Peppers (Spice)	15,333	84		183	15,431	199		78	4,061	48		84	5,117	111		46
Potato					179,386	1,460		123	1,335,375	8,787		152				
Tomato (Fresh Market)	307,375	2,132	1%	144	73,886	927		80	201,462	2,022		100	85,325	1,969		43
Processing Tomato									3,181,153	82,217	29%	39				
Watermelon	273,581	1,443	8%	190	4,410	40		109	154,430	2,010	11%	77	4,146	132		31
Cantaloupe	172,390	992	2%	174	78,899	1,078	2%	73	319,204	4,494	7%	71	6,049	321		19
Other Melons	30,094	162	1%	185	76,464	1,055	5%	72	98,083	2,090	10%	47	56	10		5
Head Lettuce	276,267	1,009	1%	274	31,631	365		87	259,219	1,574	1%	165	83,460	1,022		82
Leaf Lettuce	149,470	520	1%	287	10,185	127		80	268,760	1,742	5%	154	23,314	352		66
Other Leafy Vegetables					37,247	498		75	199,791	1,532		130				
Crop	Methyl Bromide				Telone				Metham Sodium				Chloropicrin			
	Amount	Area	Rate		Amount	Area	Rate		Amount	Area	Rate		Amount	Area	Rate	

	lbs	acres	%	lbs/ac	lbs	acres	%	lbs/ac	lbs	acres	%	lbs/ac	lbs	acres	lbs/ac
Carrots	181,880	1,063	1%	171	859,560	8,539	12%	101	5,415,745	30,408	42%	178	12,627	1,624	8
Eggplant	49,710	206		242					4,860	39		126	5,485	135	41
Asparagus	46,005	124	0%	370					16,457	92		179	3,143	110	29
Celery	27,619	125	1%	221	5,961	64		92	56,282	377		149	21,892	155	141
Onion	11,236	41	0%	277	20,254	197		103	226,520	1,913	5%	118	5,597	126	44
Garlic									38,441	357		108			
Broccoli	49,662	196		253	47,924	554		86	272,883	2,634	2%	104	3,145	156	20
Cauliflower	21,371	120		178	4,000	50		81	39,561	500		79			
Other Cole Crops									38,999	339		115			
Brussel Sprouts					79,157	962	24%	82	84,075	1,119	28%	75			
Cucumber									37,229	458	9%	81			
Other Vegetables	120,336	583			17,406	164		106	205,029	2,055		100	46,159	708	65
Total - Ann. Fruits & Veg.	7,305,569	36,595			1,722,880	17,741		97	13,007,578	150,739		86	2,435,779	31,621	77
Field Crops															
Cotton	10,472	26		397	11,470	95		120	1,259,088	32,402	3%	39			
Other Field Crops	79,722	353			26,971	274		99	107,665	2,683		40	5,626	335	17
Total - Field Crops	90,195	379			38,440	369		104	1,366,754	35,085		39	5,626	335	17
Nursery/Ornamentals															
Container/Field Grown Plants	1,123,020	3,446		326	67,458	269		250	19,966	120		166	63,561	9,662	7
Plants in Containers - Greenhse	8,189	23		356					19	0			287	23	13
Transplant/Proptn Mtrl - Outdr	559,546	2,130		263	21,518	68		317	126,462	448		282	171,698	1,884	91
Transplant/Proptn Mtrl - Grnhs	2,992	15		200									1,086	9	122
Cut Flowers/Greens - Outdoors	483,654	1,591		304	20,552	96		214	13,378	88		152	62,526	1,562	40
Cut Flowers/Greens - Grnhse	78,134	231		338					65	1		46	2,794	121	23
Total - Nurseries/Ornamentals	2,255,534	7,436			109,529	433		253	159,889	657		243	301,952	13,260	97
Miscellaneous Soil Fumigate															
Ornamental Turf	135,820	385		353					79,029	314		251			
Misc Ornamentals/Trees													6,106	503	12
Misc Soil Fumigation - Ag	45,463	185		246	8,430	39		214	40,083	359		112	78,165	1,070	73
Misc Soil Fumigation - Non-Ag	31,751	10			8,793	60			155,947	180			15,015	131	
Total - Misc Soil Fumigation	213,034	579			17,222	99			275,059	853			99,285	1,703	
Total Soil Fumigation	14,370,187	60,681			2,435,076	20,555			14,930,815	189,678			2,900,537	53,996	